

W. W. Hansen Experimental Physics Laboratory

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Gravity Probe B Relativity Mission

PROCEDURE FOR

Science Telescope Field of View Scans

GP-B P0229 Rev -

January 20, 1998

Prepared by: Suwen Wang Engineer

Approved by: John Lipa Manager, Telescope Development

Approved by: B. Taller Quality Assurance

Approved by: J. Turneaure Hardware Manager Date

Date

Date

Date

GP-B Procedure Document 229

Science Telescope Field of View Scans

R. E.: Suwen Wang ESTIMATED DURATION: 1 day.

Objective:

Perform measurements on telescope response in the range of the entire field of view along the orthogonal readout axes.

Requirements:

- Procedure to be performed by certified personnel only.
- Certified personnel include: Suwen Wang

Authority to redline this procedure:

Suwen Wang

Precautions:

- Science Telescope is well protected in the test probe in this procedure. No direct or indirect mechanical contact will be made to the telescope. Therefore, no special caution is needed in handling in this procedure.
- No special electrostatic handling precaution required.

Calibration:

• The scan data related to verifying the telescope performance specifications is in a format of relative numbers. Therefore, no calibration is required for the procedure.

Ground Support Equipment required:

- Telescope room temperature readout electronics.
- Centris 650 computer with data acquisition system.

Expendable Materials required:

• None.

Initial Configuration:

- Telescope under test:
 Dwg No: 25091-201 Rev Telescope Serial No.
- Telescope probe being attached to Artificial Star #2.
- Procedure Start Date:

^{1.} Procedure for a scan:

- 1.1. Align the star so that the image forms on the telescope axis to within 1 arc sec.
- 1.2. Set instrument parameters per table 1 below.
- 1.3. Open the application ScanStar v. 1.0 if it is not already open. The application is on MacIntosh Centris 650 located in Telescope Lab.
- 1.4. Set all the parameters as indicated in table 2 below. Set A Mtr # to Dewar X.
- 1.5. Click the run arrow in the application to start the scan.
- 1.6. Make sure that no one is allowed to touch the star during the scan.
- 1.7. When the scan is complete, the run busy signal will disappear.
- 1.8. A set of files of the name: Scan_Dir#_date will be created.

Here:

Dir can be either x or y for the scan direction

is the serial number of the scan of the day

date is the date in the format of m/d/y

- 1.9. Record the file names in table 3 below.
- 1.10. Set A Mtr # to Dewar Y and repeat procedures 1.6 through 1.10.
- 1.11. Procedure 1 complete.

Signed: _____ Date: _____

- 2. Data analysis
- 2.1 Plot the scan data with Igor Pro software.
- 2.2 Determine the peak signal for each channel.
- 2.3 Determine the field of view for 5% of the peak intensity and 10% of the peak intensity for each axis and give the numbers below.

+X axis, 5%:

+X axis, 10%:

-X axis, 5%:

-X axis, 10%;

+Y axis, 5%:

+Y axis, 10%:

-Y axis, 5 %:

-Y axis, 10%:

Table 1. Instrument Parameter Settings

(Tolerances are 10% unless otherwise noted)

| Instrument/Parameter Name | Setting | Inspector Stamp |
|---------------------------|------------------------------|-----------------|
| Star Suspension | 55 psi front, 35 psi back | |
| Star Chamber Pressure | 500 torr nominal | |
| Star Laser Diode Current | 11.0 mA (+/- 0.1 mA) | |
| Star Focus Adjustment | At focal point (6 turns out) | |
| Telescope Probe Pressure | At vacuum (< 1 torr) | |
| Telescope Temperature | 295 K | |

Table 2. Application Parameter Settings

| Button Name | Setting | Inspector Stamp |
|---------------------|-------------------------|-----------------|
| Function | Init & Run | |
| Serial Port | IP Serial B | |
| Scan Type | X Scan | |
| Init Mtr Mvmnt | Rewind | |
| Mtr Spd (stps/sec) | 50 | |
| Mtr/PZT | Stp Mtr | |
| # Grids | 600 | |
| Tot # Stps | 1200 or as appropriate | |
| Init A | 0.50 | |
| Init B | 0.50 | |
| A Mtr # | Dewar X or Dewar Y | |
| B Mtr # | NOT USED | |
| Init Mov Dirtn | Positive | |
| Sample Rate (1/sec) | NOT USED | |
| # Samples/Chan | NOT USED | |
| Sample Mode | Slope | |
| Seq # | 1 | |
| A/D Brd # | 6 | |
| Chan Seq. | 0 - 0, 1-1, 7-7 | |
| Gains | 0-7: 100 | |
| Starting | 0.2 | |
| Fit | 0.6 | |
| Preamp Gain | 1 for RT and 100 for LT | |

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| # pts | 250 | |
|---------------|---------|--|
| # of slp Avrg | 10 | |
| Data Rate | 2500.00 | |

Table 3. File Names for Fine Scans

File Path Name:

| Temperature | Scan Sequence # | Date | Scan Axis |
|-------------|-----------------|------|-----------|
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